SCAFFOLDING TASKS: THE FENCE OR THE YARD?

Adapted from North Carolina's Core Essentials Mathematics Program
APPROXIMATE TIME: 3-5 Days

STANDARDS FOR MATHEMATICAL CONTENT:

MCC.3.MD.7 Relate area to the operations of multiplication and addition.

MCC.3.MD.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Area can be found by tiling a rectangle and then counting the square units used to cover the rectangle or multiplying the side lengths to show it is the same. Students will also be using this knowledge to solve real world problems.

To find the area, one could count the squares or multiply $3 \times 4 = 12$.

1	2	3	4
5	6	7	8
9	10	11	12

Students develop an understanding of the concept of perimeter by walking around the perimeter of a room or space, such as the playground or parking lot, using rubber bands to represent the perimeter of a plane figure on a geoboard, or tracing around a shape on an interactive whiteboard. They find the perimeter of objects; use addition to find perimeters; and recognize the patterns that exist when finding the sum of the lengths and widths of rectangles.

ESSENTIAL QUESTIONS

- How are the perimeter and area of a shape related?
- How can rectangles have the same perimeter but have different areas?
- What methods can I use to determine the area of an object?
- How can I demonstrate my understanding of the measurement of area and perimeter?

MATERIALS

- Math Journals (or paper)
- Manipulatives/cut outs (to help students create models for their problems)
- Tape
- Geoboards

GROUPING

Students may be grouped individually, in pairs, or in small groups at the teacher's discretion.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I (Whole Group)
As a class, try these activities to build understanding of the concepts of area and perimeter. Discuss and clarify misunderstandings and misconceptions.

Array Scavenger Hunt

Where are rectangular arrays used? Go for a walk through the school. Look in your classroom, your home, or outside to find examples of arrays. List the examples you find and write a multiplication equation for each array.

Comparing Area and Perimeter

Find a place in your school where there are square tiles. (Many schools have square tiles on the floor. If there are none, this activity can be done using geoboards.) With a teacher's help, use tape to outline different rectilinear shapes. You can also create "Tetris-like" shapes as well.

- Find the perimeter of each shape.
- Find the area of each shape.
- Discuss the difference between the area and perimeter of your shapes.

Part II (Small Group)

"The Situation Station"

In small groups, discuss these questions and topics. Use pictures, numbers, models, and words to prove your thinking. When you are finished, compare your findings with other groups.

Situation #1: If someone says, "Perimeter is the fence, and area is the yard", what do they mean?

Situation #2: You want to know the number of small squares on a checker board. Explain how a rectangular array could help you determine the number of squares quickly.

PART III (Partner Task)
Complete this task with a partner.

Use unit squares or tiles. The smallest size square you can make is from one square. Use the squares or tilesto make the next size square.

- How many squares did you use? What is the area of your new square?
- Build the next size square. What is the area of your new square?
- What do you notice?
- Can you figure out what the next square will be without using the tiles?
- How can you find "the next square?"

FORMATIVE ASSESSMENT QUESTIONS

- How did you find the area?
- How did you find the perimeter?
- What is the difference between area and perimeter?
- How do multiplication and arrays relate to area?

DIFFERENTIATION

Extension

- Draw or cut out all possible rectangles with a perimeter of 16 inches and label them. How many different rectangles can you find? Find and record the area of each rectangle. Which rectangle has the greatest area? If you were building a dog pen, which rectangle shape would be best? Why?

Intervention

- With a partner, make a t-chart. Label one side "perimeter." Label the other side "area."
  - Discuss times when someone would need to know the perimeter of something. Add them to the list.
  - Discuss times when someone would need to know the area of something. Add them to the list.
  - Share your list with other groups.